



Seismotectonics of Taiwan Shoal region in northeastern SCS: Insights from crustal structure

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Abstract A seismicity cluster and a great 16 September 1994 earthquake occur in the Taiwan Shoal region, outer rise of the Manila subduction zone. To understand what mechanisms control and generate the earthquake cluster, it is important to investigate the deep crustal structure of the Taiwan Shoal region. We present a 2-D seismic tomographic image of the crustal structure along the OBS2012 profile based on ocean bottom seismographic (OBS) data. The structure exhibits that a high velocity anomaly in the upper crust beneath the Taiwan Shoal is flanked by lower velocity anomalies. Based on the crustal structure, we study the 765 earthquakes, which occurred in the period 1991–2015. These epicenters, combined with the regional faults, and crustal structure, allow us to better understand the nature of the active tectonics in this region. The high velocity area is interpreted as representing stronger, defining major asperities where stress is concentrated corresponding to the location of the earthquake cluster. The earthquake cluster is influenced by the fault interactions. However, the 16 September 1994 earthquake is independent of the seismic activities but associated with the reactivation of the preexisting fault. In Taiwan region, the slab-pull was resisted by the exposed pre-collision accretionary prism and the resistive force caused the in-plane compressive stress accumulation. This condition may favor the triggering of future damaging earthquakes in this region.

Key words: earthquake cluster; crustal structure; fault interactions; outer rise; Taiwan Shoal